UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,274,747 B1
APPLICATION NO. : 09/625201
DATED : September 25, 2007
INVENTOR(S) : Lobo

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 2, beginning with Line 48 through Column 3, Line 46, the specification should read as follows:

--The present invention may be used to compensate for one or plurality of components. This method reduces the mathematical complexity in determining the level of distortion to be compensated for by two components. In a preferred embodiment, the telecommunication system is GSM, the first component is a reconstruction filter and the second a non-linear power amplifier. In this case, firstly the pulse function required for compensation of the reconstruction filter is determined, and then a second pulse function which would result in the reconstruction filter compensation pulse function is compensating for the power amplifier.

Desired cost parameters may be defined on the basis of a number of telecommunication system requirements, including TDMA and CDMA. One type of TDMA system is GSM, and a pulse function may be defined according to the method of the present invention such that a conventionally shaped Gaussian pulse may be transmitted. Alternatively, the pulse function may be defined to take other cost functions into account.

Similarly, for CDMA, the pulse function may be defined conventionally such that a pulse of a root raised cosine shape may be transmitted, or alternatively the pulse function may be defined to take other cost functions into account.

According to another aspect of the present invention, the defined pulse function is generated by a pulse function generator.

According to a further aspect of the present invention, a modulator is provided which comprises means for shaping a data stream in accordance with the defined pulse function.

The means for shaping a data stream advantageously comprises a look-up table.

According to other aspects of the present invention, there is provided a transceiver for a communication device comprising such a modulator and a demodulator, and a communication device, comprising such a transceiver.

According to a still further aspect, there is provided a dual mode communication device operable in a first mode in a TDMA telecommunications system in which a channel is a combination of frequency and timeslot and a second mode in a CDMA telecommunications system, comprising a modulator for modulating a data stream with a carrier signal in accordance with a predetermined modulation scheme in both the first and second modes of operation and a pulse function generator for shaping a data stream in accordance with respective pulse functions responsive to the mode of operation of the radio telephone and distortion by a component of the transmitter.--.

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Column 2, beginning with Line 48 through Column 3, Line 46, the specification should read as follows (continued):

--According to another aspect, there is provided a dual mode communication device operable in a first mode when a first set of cost parameters are desired and in a second mode when a second set of cost parameters are desired, the radiotelephone comprising:
a first pulse function generator for converting a data stream in accordance with a pulse function shaped in dependence on the first set of desired cost parameters;
a second pulse function generator for converting a data stream in accordance with a pulse function shaped in dependence on the second set of desired cost parameters; and
means for selecting the pulse function generator in accordance with the mode of operation of the phone;
wherein at least one of the pulse functions is shaped in accordance with the relationship defined by any of the above methods.--.

Column 4, beginning with Line 11 through the word "improves" in Column 5, Line 18, the specification should read as follows:

--determining the resultant cost parameters for each scheme; and
selecting the modulation scheme which gives good resultant cost parameters given the desired ones. In prior art modulation schemes, the pulse functions used to shape the data streams have had a predefined mathematical relationship.

For example:
root raised cosine

$$H(f) = 1 \qquad |f| < \alpha$$

$$H(f) = \sqrt{\frac{1}{2}(1-\cos(2\Pi(f-(T+\alpha))} \qquad \alpha < |f| \leq T+\alpha$$

$$= 0 \qquad |f| > T+\alpha$$

for CDMA systems in which QPSK modulation is used and PDC and NADC systems in which DQPSK modulation is used.--.

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Column 4, beginning with Line 11 through the word "improves" in Column 5, Line 18, the specification should read as follows (continued):

--Gaussian

$$H(f) = \frac{1}{\sqrt{2\Pi_\sigma}} e^{-f^2/2a^2}$$

for GSM in which an MSK modulation scheme is used.
With pulse shapes according to the conventional predefined mathematical relationships only one parameter is variable for a given energy level. For the gaussian pulse this is 'sigma' that varies the spread of the pulse allowing the bandwidth to alter at the expense of amplitude. For the root raised cosine the variable is 'alpha' that varies the frequency at which the cosine tail begins. This effects the bandwidth and consequently the power efficiency. The relationship between the cost parameters is well defined so as one improves the other declines in a determined fashion. That is, there is no scope for altering the bandwidth without the detriment of power inefficiency.
Because of the severe restrictions placed on the trade-offs achievable by varying the single variable for the predetermined mathematical functions, the pulse shape most appropriate for each modulation scheme is quite clear. The system designer conventionally makes a decision on which modulation scheme based on its strengths and weaknesses and selects the appropriate pulse shape based solely on that chosen modulation scheme (i.e. a Gaussian for GMSK and a root raised cosine for QPSK). He does not take distortion of the ideal pulse shape into account when determining the modulation scheme to be used. The single variable of the mathematical function is set to provide an acceptable balance in the defined relationship between the cost parameters.
In the present invention, there is no predetermined mathematical relationship for the pulse shaper. The shape of the pulse is defined in order to compensate for distortion by one or more transmitter components. There is freedom to select new pulse shapes that compensate for distortion so that the transmitter can transmit a signal of appropriate (potentially ideal) shape for the chosen modulation scheme, such as a Gaussian or root raised cosine.
In a preferred embodiment, pulse shapes may be chosen which provide for compensation, and furthermore allow many cost parameters to be balanced against each other since the trade-off relationship between two parameters is no longer defined so restricted. This leads to a number of interesting possibilities, which will outlined below.--.

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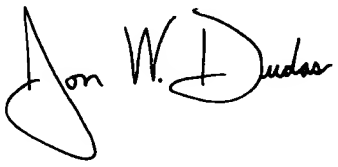
Column 4, beginning with Line 11 through the word "improves" in Column 5, Line 18, the specification should read as follows (continued):

--With this preferred embodiment of the present invention, it is not necessary for the pulse shape in MSK to be gaussian. Although this particular pulse--.

Signed and Sealed this

Thirteenth Day of May, 2008



JON W. DUDAS
Director of the United States Patent and Trademark Office